FUNCTIONAL VISION: SUPPORTING CHILDREN WITH SPECIAL NEEDS

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VOTA School Symposium March 8-9, 2019

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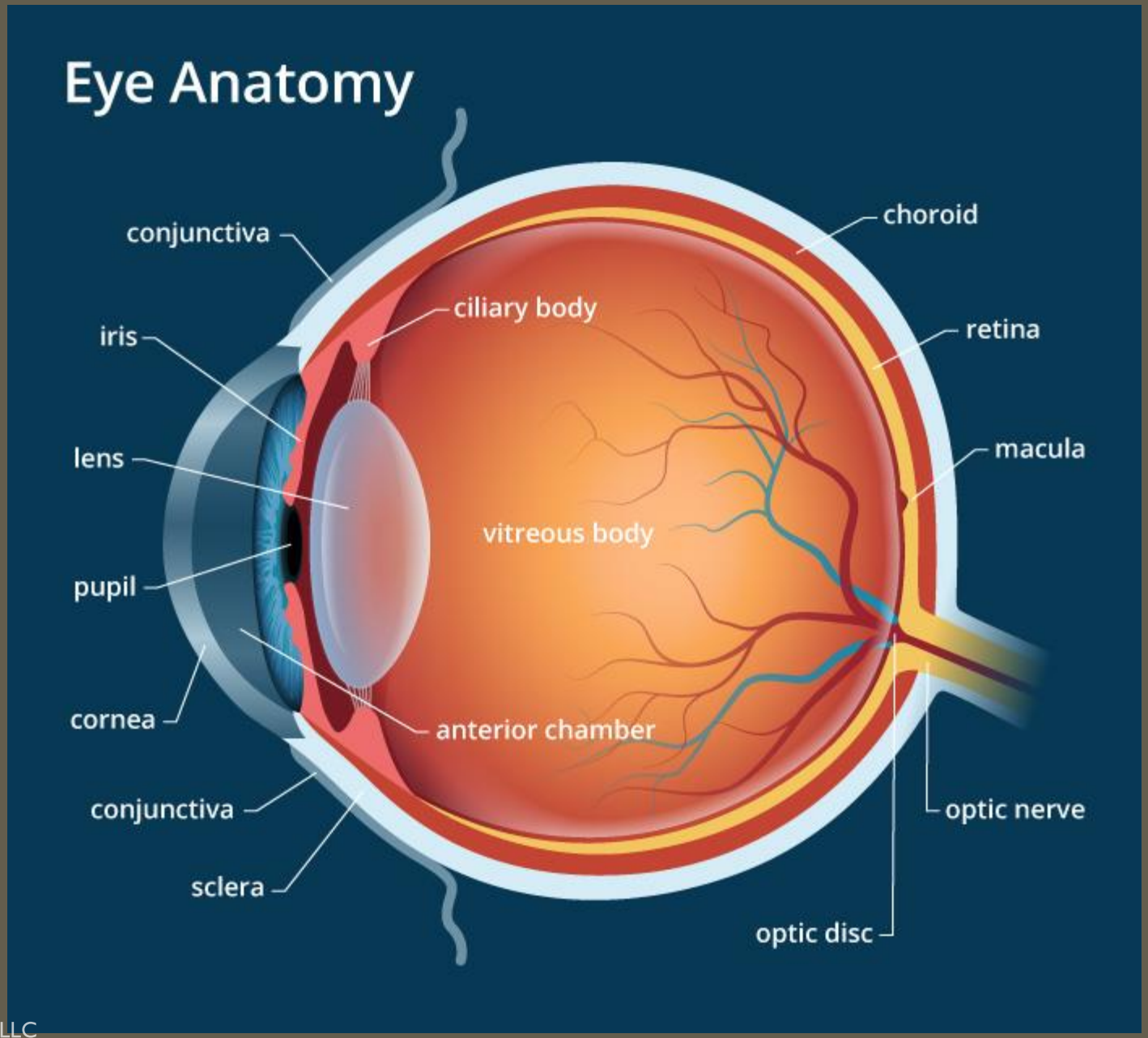
INTRODUCTIONS & OBJECTIVES

Objectives:

- Review and understand basic eye anatomy.
- Describe the highlights of basic visual development.
- Define and understand basic functional vision terminology and how it to relates to children across settings.
- Describe the functional implications of a deficit in component areas of functional vision.
- Understand how to perform a basic functional vision assessment and when to refer to an outside professional.
- Learn some fundamental treatment strategies to address functional vision deficits across practice settings.

WE SEE WITH OUR BRAINS!



www.allaboutvision.com

SIGHT VS. VISION

- Sight
  - Ability of the eye to respond to light shining into it
  - Visual acuity
  - Innate skill dependent upon integrity of visual system
  - Static process

You must have sight in order to have vision!

- Vision
  - Ability to understand what is being seen
  - More than 20/20 visual acuity
  - Learned process that develops as children age
  - Dynamic process

Functional vision is synthesizing sight with movement.

"EYESIGHT IS THE SHARPNESS OF THE IMAGE SEEN BY THE EYE. VISION IS THE ABILITY TO FOCUS ON AND COMPREHEND THAT WHICH IS SEEN."

~ Patricia Lemer, M.Ed.
Eye Power: A Cutting Edge Report on Vision Therapy

Vision is the ability to understand the surrounding environment and our place within through the processing of visual information combined with information from our proprioceptive and vestibular systems.

NORMAL FUNCTIONAL VISION

1. See clear and single without corrective lenses
2. See clear and single at ALL distances
3. See clear and single at all positions of gaze

Most academic learning occurs within 12-20 inches from our eyes, so why do schools and doctor's offices only look at visual acuity during well-child checks?

VISUAL DEVELOPMENT

- At Birth:
  - Primary visual fixation
  - Tracking abilities
  - Acuity for mother's breast to face

80 percent of what a child learns in school is information that is presented visually

- Visual Acuity reaches optimal functioning at 18 years, and then declines thereafter
- 5 years- maximum accommodation is reached

PREVALENT STAGES OF VISUAL DEVELOPMENT

- Reflexes
  - Righting Reactions (proprioceptive)
  - Equilibrium (vestibular)
- Vision leads motor skills during first 7 years of life after righting reactions are established
- Vestibular-Cervical Reflex
  - Fires receptors in neck to change direction
  - Must promote good head/neck alignment for integration of vision
- Mouthing of toys
- Creeping

PREVALENT STAGES OF VISUAL DEVELOPMENT

- Postural Stability
  - Permits eyes to move and head to be stable and vice versa
  - Brings head perpendicular to BOS

The majority of visual-perceptual deficits are in foundational skills. These skills must be integrated in order to proceed to higher level visual skills.

Foundational → Perceptual

FOUNDATIONAL SKILLS

- Oculomotor control: ability to control eye movements
  - Common impairment is NYSTAGMUS
- Visual Field: area perceived when looking straight ahead (having central fixation)
- Visual Acuity: clarity of objects we perceive
  - Myopia
  - Hyperopia
  - Astigmatism

These skills must be integrated in order to proceed to higher level visuo-cognition skills such as visual attention.

RELATIONSHIP OF MOVEMENT AND VISION

- Postural stability → Visual Stability
- Trunk Rotation → Lateral Eye Movements
- Full Extension/Flexion of Trunk → Vertical Eye Movement
- Neck & Head Control → Free Eye Movement

TWO VISION PATHWAYS: CENTRAL (FOCAL) & PERIPHERAL (AMBIENT) VISION

- Central:
  - Provides detailed information about environment such as color (cones)
  - Starts to develop at 6 months of age because macula has not developed for focal processing and there is no myelin sheath
  - Connects us to higher cortical thinking of attention and concentration
- Peripheral:
  - provides general information about environment
  - Functioning system at birth
  - Integrates with kinesthetic, proprioceptive, vestibular to ground us
  - Filters out details of periphery
  - Remove ambient, and there is no filter so you focalize on all the details

Both systems must integrate in order to efficiently function!

VISUAL PERCEPTUAL SKILLS/ TERMINOLOGY

- Form Constancy
- Visual Closure
- Spatial Perception
- Figure Ground
  - VISUAL ATTENTION requires the ability to visually relate to the figure while maintaining the ground as a frame of reference
- Visual Memory
- Spatiotemporal Orientation
  - Social functions
  - Dancing, sports
  - Sharing, taking turns
  - Driving
  - Using revolving doors, escalators, elevators
- Depth Perception

Visuo-Cognition (visualization) is the ability to mentally manipulate visual information and integrate it with other information in order to solve problems, formulate plans, and make decisions. (Warren, 1994)

PREVALENCE OF VISION ISSUES IN CHILDREN

- Nearly 3 percent of children younger than 18 years are blind or visually impaired (defined as having trouble seeing even when wearing glasses or contact lenses).
- Amblyopia, found in about 2 percent of 6- to 72-month-old children, is the most common cause of vision loss in children.
- Between 2 and 4 percent of children under the age of 6 years have strabismus, a misalignment of the eyes that can lead to the development of amblyopia.
- 4% of children 6 to 72 months of age have myopia.
- 9% of older children (ages 5 to 17 years) have myopia.
- 21% of children 6 to 72 months of age have hyperopia.
- 13% of children ages 5 to 17 years have hyperopia.
- 15-28% of children ages 5 to 17 years have astigmatism

Data taken from www.preventblindness.org

CAUSES OF VISUAL ISSUES

- Birth history/traumas
- Prematurity
- Adoption
- Developmental delays
- Skipping important developmental milestones
- Post Trauma Vision Syndrome
- Neurological events
- Genetics
- Unknown

BASIC TERMINOLOGY OF VISUAL SKILLS

- Fixation- attention
- Tracking/Pursuits- following moving target (fixation should not be lost)
- Saccades- moving eyes over stationary target (changing fixation)
- Accommodation- changing the focusing system
- Convergence- eyes turning inward; near details and clarity
- Divergence- far sight and periphery

Perception- mental manipulation of the visual stimulus to integrate it with the other senses

BASIC TERMINOLOGY OF VISUAL SKILLS

- Optokinetic or Post-Rotary Nystagmus- vision-vestibular integration
- Binocularity- eye teaming
  - Binocular Vision Dysfunction
    - Strabismus
    - Convergence insufficiency
    - Accommodative dysfunction
    - Oculo-motor dysfunction
- Scanning- search and find

ASSESSMENT OF FUNCTIONAL VISION

- Visual tracking at near point (binocular and monocular)
- Brock string
- 30 Question Predictive Checklist
- Reading Skills
- Handwriting
- Ball Skills
- PRN
- Skilled Clinical Observations!

ASSESSMENT OF FUNCTIONAL VISION: SKILLED CLINICAL OBSERVATIONS

- Bilaterality
- Body awareness
- Upper and lower body segmentation
- Lack of visual dominance (central vs. peripheral)
- Mouthing
- Smelling
- Touching
- Spatial awareness/environmental navigation

ASSESSMENT OF FUNCTIONAL VISION: SKILLED CLINICAL OBSERVATIONS

- Visual stim behaviors
- Eye contact
- Sustained visual attention
- Activity level
- Screen time
- Signs of visual overload
- Watery eyes
- Eye rubbing

BASIC TREATMENT STRATEGIES

- Ball games
- Trampoline
- Suspended equipment
- Worksheets:
  - Mazes
  - hidden pictures
  - Finding differences
- Letter and word searches
- Memory games
- Balloon games
- Puzzles
- Matching activities

THINK DEVELOPMENTALLY: What underlying component deficits are there? What are gross motor skills like? Is there adequate postural control? Do you need to eliminate the focus on upright posture?

BASIC TREATMENT STRATEGIES

- Flashlight/laser pointer activities
- Scooter board
- Scavenger hunts

- Education: GOOD VISUAL HYGIENE
  - 20/20/20 RULE
- Gross motor activities involving midline crossing and rotation at hips

Start at the level in which the child can succeed, but still feels a challenge.

BASIC TREATMENT STRATEGIES/MODIFICATIONS IN THE ACADEMIC SETTING

- Slant board
- Increased time to copy
- Copy at near point (not far point)
- Minimize visual distractions in environment
- Minimize visual distractions on worksheets
  - Highlighted lines
  - Modified lined paper
- Colored overlays
- Optimize desk placement
- Provide postural supports/alternative seating
- Referral to outside specialist- be careful with this!

ADVANCED TREATMENT STRATEGIES

- Brock string
- Primitive reflex integration
- Astronaut training
- Spin & fixate activities
- Infinity walks
- Multi-matrix
- Metronome activities
- Bal-A-Vis-X
- Therapeutic Listening

VISION TEAM

- OT Practitioners
- Optometrists (General)
- Developmental or Behavioral Optometrists
- Ophthalmologists
- Low Vision Instructors
- Orientation and Mobility Specialists (O & M)
- Mental Health Practitioners
- Teachers

VISION RESOURCES

WEBSITES:

- **Continuing Education Courses for neurology and functional vision:** www.cliniciansview.com
- **Optometric Extension Program:** www.oep.org
- **College of Optometrist in Vision Development:** www.covd.org
- Neuro-Optometric Rehabilitation Association: www.noravisionrehab.org
- www.eyecanlearn.com

BOOKS:

- Developing Ocular Motor and Visual Perceptual Skills By Kenneth Lane
- Eyegames: Easy and Fun Visual Exercises By Hickman & Hutchins
- Fixing My Gaze by Susan Barry, PhD

QUESTIONS??